



Janet Lewis, Chief Electrical Inspector

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## Electrical code issues and answers.

### ● THE 1999 NATIONAL ELECTRICAL CODE IS NOW IN EFFECT!

The 1999 NEC became effective in the State of Washington March 15, 1999. Our inspectors will allow a transition period until June 30, 1999, where either the 1996 or the 1999 NEC (not a mixture) can be applied to an electrical installation. All projects for which an electrical work permit is purchased after June 30, 1999 will be inspected under the 1999 NEC. All projects submitted for electrical plan review after June 30, 1999 will be reviewed under the 1999 NEC.

All NEC Articles referenced in this and future **ELECTRICAL CURRENTS** will be for the 1999 NEC unless otherwise noted.

### ● Service rated transfer equipment for optional standby systems

Many existing services are being retrofitted with back-up generators and transfer equipment for optional standby power supply capability. If new transfer equipment is installed ahead of an existing service disconnect, installers must be aware that transfer equipment then becomes the service disconnecting means must meet certain requirements. The transfer equipment must be listed and labeled by an approved testing laboratory and be identified as suitable for the intended use, and be marked "SUITABLE FOR USE AS SERVICE EQUIPMENT."

Compliance with this listing ensures that a manual method of disconnecting both the normal and alternate sources of power is provided. The transfer equipment may contain the service overcurrent protection. If the service overcurrent protection is not an integral part of the transfer switch, then the service overcurrent protection must be located immediately adjacent to the transfer equipment per NEC 230-91. "Immediately adjacent" means that no intervening barriers separate the service disconnect from the service overcurrent protection and that they be in close proximity. An overcurrent device on the opposite side of a wall from the transfer equipment is not acceptable for compliance with NEC 230-91.

### ● Documentation of hazardous location boundaries required before inspection


New section NEC 500-3(b) is a significant change to the requirements for setting the boundaries of hazardous (classified) locations listed in Articles 501, 502, 503, and 505. NEC 500-3(b) requires that *"All areas designated as hazardous (classified) locations shall be properly documented. This documentation shall be available to those authorized to design, install, inspect, maintain, or operate electrical equipment at the location."* The facility owner shall provide documentation or plans showing all hazardous (classified) area boundaries. The documentation shall be made available at the site for the electrical inspection. This documentation does not preclude the authority having jurisdiction (AHJ) from imposing more stringent requirements on the installation.

NEC 510-2 states that *"...the provisions of Articles 500 through 504, shall apply to the electric wiring and equipment in occupancies within the scope of Articles 511 through 517, except as such rules are modified in Articles 511 through 517."* The requirements of Articles 511 through 517 (e.g. the classified area around gasoline dispensers described in NEC 514) are minimum requirements that must be met or exceeded in the documentation of hazardous (classified) locations described in NEC 500-3(b).

### ● Supplemental and made grounding electrode systems - two ground rods required?

The NEC has clarified the type of installation required for supplemental electrodes. The NEC 250-50(a)(2) states that *"A metal underground water pipe shall be supplemented by an additional electrode. Where the supplemental electrode is a made electrode...it shall comply with Section 250-56."* The new reference to Section 250-56 requires that a supplemental made electrode (typically a ground rod) *"...that does not have a resistance to ground of 25 ohms or less shall be augmented by one additional electrode..."* For most installations, this means that two ground rods will be installed supplementary to a water pipe electrode or at an additional building where a made electrode needs to be established. The 1996 NEC 250-81(a) implied this type of installation, but did not specifically reference 1996 NEC 250-84 regarding resistance to ground requirements necessary for the made electrode to be considered an effective electrode.

### ● Recognized Components and Listed Components

The Underwriters Laboratories General Information for Electrical Equipment (white book) directory defines Recognized Components (identified by the  mark) as “...products that are incomplete in construction features or limited in performance capabilities. The Recognized Component Mark does not provide evidence of listing or labeling which may be required by the National Electrical Code or other installation codes or standards.” The State of Washington does not approve Recognized Components as stand alone products.

Listed Components are those products that are tested by an approved testing laboratory to be complete in function and performance (i.e. have the ability to stand-alone). A Listed Product may contain Recognized Components and/or Listed Components. A Listed product will bear an approved Listing Mark from an approved testing laboratory (e.g. An industrial Control Panel bearing its own separate Listing Mark while containing both Recognized and Listed Components). A Listed product may also be a stand alone Listed Component/Product (e.g. A standard motor starter). All electrical products installed in the State of Washington must bear an approved Listing Mark, field evaluation label, or inspection label.

### ● Small project plan review

WAC 296-46-140(6) has a provision for allowing small projects to have the electrical plan review done at the local inspection office. The rule states “*When a service or feeder is affected five percent or less by the addition or alteration of five or less branch circuits, plan review may be requested from the local inspection office. Permission for such small project plan review shall be granted at the discretion of the electrical inspection field supervisor, the plans examiner supervisor, or the chief electrical inspector.*” The keys to this kind of review are the “five-percent or less” and “five or less branch circuits” provisions. Just because a project falls within these parameters does not automatically mean that this type of review will be allowed. The local electrical inspection field supervisor may require formal plan review through central office if the loads are close to equipment capacity and rating or if the project is complex. Plans reviewed at the local service location still require complete documentation and must meet all of the requirements outlined in the **Electrical Plan Review Submittal Guide**, available on our web site.

### ● NEC 725-54 - line and low voltage conductors in the same enclosure

The growing popularity of “smart” limited-energy lighting and appliance control systems (such as the PHAST® system by AMX or the HomeWorks® system by Lutron) has created the need to introduce line voltage conductors into enclosures with Class 2 or 3 circuit conductors. In general, NEC 725-54 states that “*Cables and conductors of Class 2 and Class 3 circuits shall not be placed in any cable, cable tray, compartment, enclosure, manhole, outlet box, device box, raceway, or similar fitting with conductors of electric light, power, Class 1, nonpower-limited fire alarm circuits, and medium power network-powered broadband communications cables.*”

There have been problems reported in the field when conventional wiring is completed in a building and a limited-energy control system installation is added to the conventional wiring system before the walls are covered. Installers attempt to add Class 2 control conductors to boxes already filled with line voltage home runs, splices, and pigtails. Some limited-energy control devices produce heat and have additional wattage limitations when double- or triple-ganged. These devices are usually much larger than conventional switches and receptacles. Some manufacturers recommend large capacity boxes and clearances in excess of the NEC 2-inch minimum separation required for limited-energy conductors running parallel to electric light, power, Class 1, nonpower-limited fire alarm circuits, and medium power network-powered broadband communications cables. The installation of limited-energy control systems requires careful planning of the electrical system before the power wiring is installed.

**Exception No. 1** to this article states that electric light, power, Class 1, nonpower-limited fire alarm circuits, and medium power network-powered broadband communications cables may be in the same enclosure provided they are installed with a barrier to separate them from the Class 2 and 3 conductors.

**Exception No. 2** allows electric light, power, Class 1, nonpower-limited fire alarm circuits, and medium power network-powered broadband communications cables to be in the same enclosure with Class 2 or 3 conductors provided they “are introduced solely to connect to the equipment connected to the Class 2 or 3 circuits”. In addition, a minimum 0.25 in. (6.35 mm) separation is required between those conductors and the Class 2 or 3 conductors.

The general separation requirement of NEC 725-54 exists to minimize the possible introduction of higher voltage potentials into Class 2 or 3 cables. Electric light, power, Class 1, nonpower-limited fire alarm circuits, and medium power network-powered broadband communications cables are permitted in enclosures with Class 2 or 3 conductors only if they perform a function directly related to the device being supplied. **Unrelated conductors or cables must be routed through other junction boxes.**